Load Link™ III
Installation Manual

CAUTION

It is essential that all instructions in this manual be followed precisely to ensure proper operation of the equipment.

KM

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NOTICE

CAUTION

Follow these rules if welding is done on the vessel after installation of the Load Link III. The electrical current of the welder may pass through the Load Link, causing damage to the transducer and possibly to the signal processor. To avoid damage, follow these precautions:

1. Disconnect the Load Link cables from the signal processor.
2. Ground the welder as close to the welding joint as possible. The welding ground must be between the Load Link and the weld joint to prevent the welding current from going through the Load Link to earth ground.

Note

High temperatures can damage the Load Link. If you are welding in the vicinity of a Load Link, monitor the temperature of the metal adjacent to the Load Link. If it becomes too hot to touch, stop welding immediately and remove the Load Link before continuing. Prior to reinstalling the Load Link, verify that no damage has occurred by checking the resistance.

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Chapter 1. Introduction

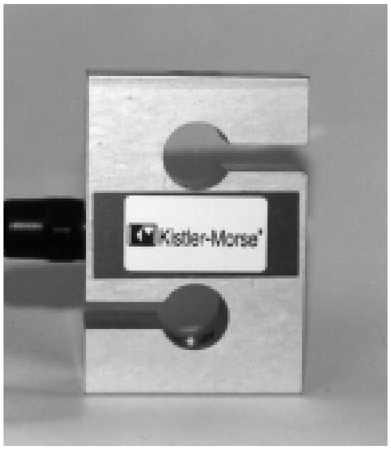


Figure 1-1. K-M Load Link™ III

Equipment Description

The Load Link III (Figure 1-1) is a highly sensitive direct support strain gage load cell used to determine the weight of material contained in storage vessels. One or more Load Link IIIs mount on structural supports, and the vessel is suspended from them. As weight is added to or removed from the vessel, each Load Link III experiences strain changes proportional to the changes in weight, and produces a voltage output proportional to those changes. A signal processor then converts this output to a weight value for display and control.

Load Link III capacities range from 50 lbs to 5,000 lbs (22 to 2268kg). Refer to Appendix A for Load Link III specifications.

Because the Load Link III mounts outside the vessel, it never comes in contact with the material inside the vessel. The Load Link III is rugged, can operate in industrial environments, and requires no periodic maintenance. Used in many different industries, the Load Link III can weigh any type of material.

The Load Link III is available with optional installation hardware designed to ease installation and minimize side loading and twisting forces on the transducer.

Manual Conventions

Three kinds of special explanations appear throughout the manual — **WARNING**, CAUTION, and *Note*. The format and significance of each is defined below:

WARNING

Possible danger to people. Injury may result if this information is ignored.

CAUTION

Possible risk to the product. The Load Link III or other equipment may be damaged if this information is ignored.

Note

Contains additional information about a step or feature critical to the installation or operation of the Load Link III.

Chapter 2. Pre-Check Procedures

Introduction

This chapter describes the pre-check procedures for the Load Link III. Verifying the application and checking the Load Links before installation will ensure installation of properly working equipment that will provide accurate monitoring of vessel contents.

Application Verification

Prior to ordering the Load Links, you should have completed the Application Data Form (KM #97-5016A). A copy of the completed form was returned to you with both the order acknowledgment and equipment shipment. If you cannot locate the form, contact K-M to get another copy before you proceed. Review the information on the form now to verify the application details.

Order Verification

Prior to beginning installation, verify that your order is complete and assemble additional equipment needed for the installation.

Load Link III Order

The following are included with the order for each vessel (quantities dependent on application):

- Load Link III
- Junction Box (plastic or stainless steel):
  - *Plastic Junction Box —*
  - #63-1282 terminal board
  - Watertight fittings (4)
  - Watertight plugs (for any cable openings that will not be used)
  - Sikaflex 1A polyurethane sealant and Material Safety Data Sheet (MSDS)
  - *Stainless Steel Summing Junction Box with fittings and trimming terminal board*

If any items are missing from the order, contact K-M before proceeding. Substituting parts without K-M approval may cause system problems and will void the warranty.

Note

A signal processor and its manual are required to calibrate the system. These may be part of your order, or you may be planning to use the Load Links with an existing signal processor.

Installation Equipment

The following are needed to install Load Links:

- Lifting equipment
- Tape measure
- Marking pen
- Drill motor
- Wrenches
- Mounting hardware
- Safety cable
- Digital Multimeter (DMM) — $4\frac{1}{2}$ digit recommended

Junction Box and Field Wiring Equipment

The following are needed to install junction boxes and perform field wiring:

- Drill motor
- Tap handle, Tapping fluid
- Screwdriver
- Belden™ 83556 22-gage 6-conductor shielded interconnect cable or equivalent (up to 200’ [61m] length)*
- Conduit and fittings or cable tray
- Caulking gun
- Sikaflex 1A polyurethane sealant or Dow Corning RTV 739 or RTV 738
- Tape (electrical or masking)

*Consult K-M for lengths over 200’ (61m)

Junction Box Hardware and Tools:

Plastic Junction Box

- #29 drill bit; #8-32, 2-flute, spiral-point tap
- #8-32 socket head cap screws
- #8 flat washers ($^{3}/_{16}$” inner diameter, $^{7}/_{16}$” outer diameter)
- $^{9}/_{64}$” Allen wrench

Stainless Steel Junction Box

- #7 drill bit; $^{1}/_{4}$-20, 2-flute, spiral-point tap
- $^{1}/_{4}$-20 stainless steel hex head bolt and nut
- $^{1}/_{4}$” stainless steel flat washers and lock washer
- $^{1}/_{4}$” Allen wrench

CAUTION

Only use Sikaflex 1A polyurethane sealant or Dow Corning RTV 739 or RTV 738. Other sealants may contain acetic acid, which is harmful to sensors and electronics.

Checking Equipment

Visual Check

Visually inspect all equipment in the order — including Load Links, junction boxes, and signal processors — to verify they have not been damaged during shipment. If any item has been damaged, contact K-M for a replacement.

Functional Check

Perform a functional check of all the Load Links before installation to verify they have not been damaged during shipment. Select ***one*** of the functional check methods described below.

Method 1: Measuring Resistance

1. Place the Load Link on a stable surface. Disconnect the Load Link from the signal processor, if previously wired.
2. Using the DMM, measure the resistance across the Load Link's -Exc and +Exc leads. Verify the resistance is between 346.5 and 400 ohms.
3. Measure the resistance across the -Sig and +Sig leads. Verify the resistance is between 346.5 and 353.5 ohms.
4. Measure resistance across the following:
   - -Sig and -Exc leads
   - +Sig and -Exc leads

   Verify these are within 1 ohm of each other.
5. Measure resistance across the following:
   - -Sig and +Exc leads
   - +Sig and +Exc leads

   Verify these are within 1 ohm of each other.
6. Repeat Steps 1 through 5 for each Load Link. If any reading for any Load Link is outside the specifications described above, contact K-M for assistance before proceeding with installation.

Method 2: Measuring Output

1. Place the Load Link on a stable surface.
2. Wire the Load Link to the signal processor, but do not connect the -Sig and +Sig leads.
3. Apply power to the signal processor.
4. Using the DMM, measure the voltage across the Load Link's -Sig and +Sig leads. Verify the *no-load* output is 0±1% of Rated Full Scale Output. (Assuming 10 V excitation, 0±1% of Rated Full Scale Output is 0±0.3 mV.)
5. Repeat Steps 1 through 4 for each Load Link. If the reading for any Load Link is outside the specifications described above, contact K-M for assistance before proceeding with installation.

Chapter 3. Hardware Installation

Introduction

This chapter describes installation and wiring of Load Link IIIs and junction boxes. Follow all instructions carefully to ensure proper operation of the system.

Vessel Preparation

There are two aspects to successful use of Load Links — properly functioning Load Links **and** appropriate vessel support characteristics. Review the following list of error sources, and make the recommended corrections before you install the Load Links:

- Hidden load-bearing structures, such as discharge chutes or plumbing supported by the floor, can reduce loads on the vessel supports. Install flexible couplings to minimize this problem.
- Cross-connecting structures, such as catwalks and manifolds, can transfer loads from adjacent vessels. Install slip joint or flex couplings to minimize this problem.
- Shock loads can damage the Load Link. Install protective barriers or stops to prevent vehicles from hitting the vessel.
- For three- and four-point support installations — Support beams must be of equal size and/or stiffness. If one beam deflects more than the other(s), it may transfer excessive weight to the other Load Links, possibly overloading them.

Installing Load Links

Installation Type

There are three installation types:

- See Figure 3-1. **Single-point supports** are often used for vessels containing liquids. Bumpers, check rods, or cables are required to limit accidental side motion. Ensure the bumpers, check rods, or cables do not cause friction and do not restrain vertical movement of the vessel. Use rotational restraints to prevent the vessel from rotating and unscrewing hardware. Do not use single-point supports for vessels containing solids, because off-center loading may occur. Off-center loading shifts the center of gravity and causes the vessel to contact the bumpers, resulting in erroneous readings.

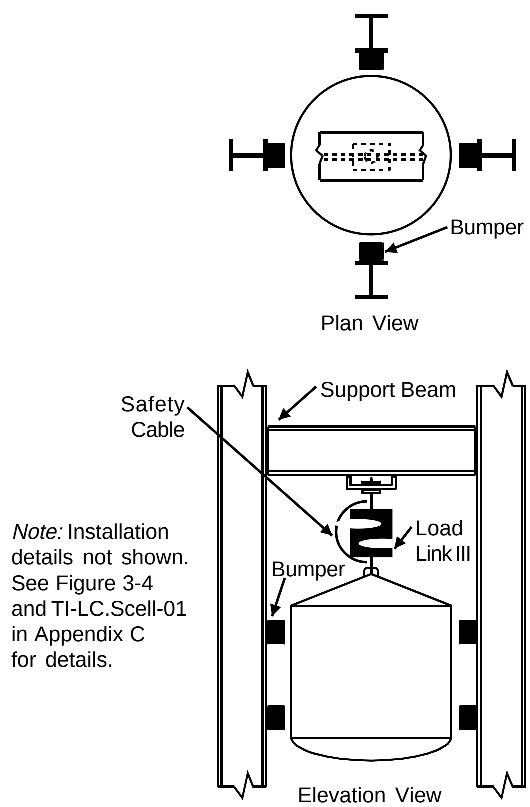


Figure 3-1. Single-Point Support Installation

- See Figure 3-2. **Three-point support** installation distributes vessel weight on three Load Links. Use turnbuckles to control the support length, ensuring each Load Link carries a proportional share of weight.

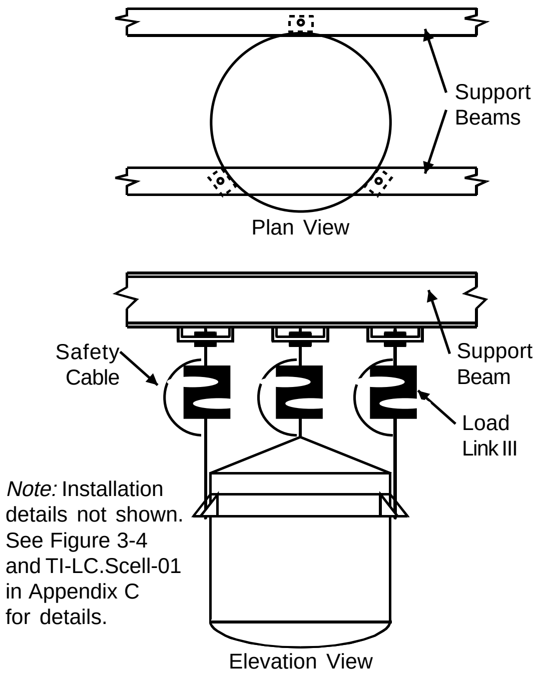


Figure 3-2. Three-Point Support Installation

- See Figure 3-3. **Four-point support** installation distributes vessel weight on four Load Links. Use turnbuckles to control the support length, ensuring each Load Link carries a proportional share of weight.

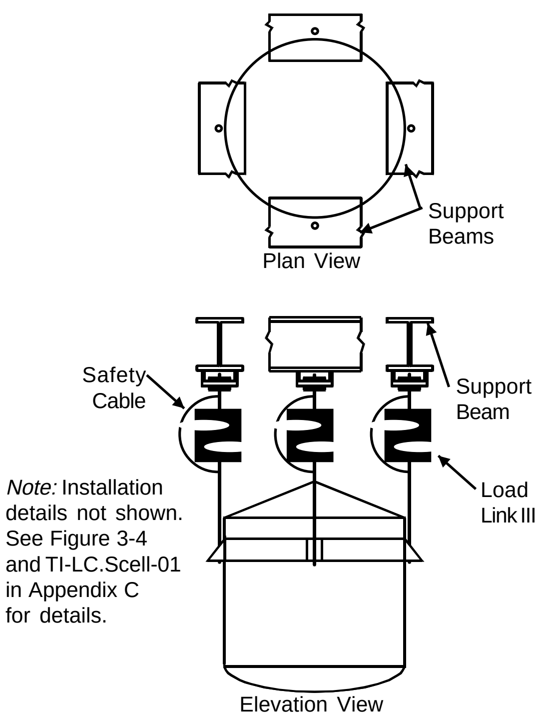


Figure 3-3. Four-Point Support Installation

Installation Procedure

WARNING

1. Use proper supports to prevent the vessel from tipping or falling during installation. Do not put all the vessel load on one Load Link for a three- or four-point system.
2. Install safety cable for each Load Link, as shown in Figure 3-4.

1. Empty the vessel.
2. Locate each Load Link so the cable cannot be snagged or chafed and can be easily routed to the junction box.
3. See Table 3-1 and Figure 3-4. Install Load Link and hardware. Refer to Appendix C, Technical Drawings, for typical mounting arrangements and hardware.
   - Install the Load Link with the K-M label right side up.
   - Use steel rod, cable, or chain to connect the Load Link to the vessel and overhead support.
   - Lock threaded connections with jam nuts.

CAUTION

Do not attach the Load Link directly to the vessel or overhead support. K-M requires the use of hardware (such as rod end bearings, eye bolts, clevises, etc.) to minimize side loading and torque forces on the Load Link. Hardware can be supplied by the customer or is available from K-M.

Model	Thread Engagement	Maximum Torque
SL3-050 **SLM3-020**	1/4" (6mm) to 1/2" (12mm)	20 in.-lbs (2.2N•m)
SL3-100 **SL3-250** **SLM3-050** **SLM3-100**	1/4" (6mm) to 1/2" (12mm)	40 in.-lbs (4.5N•m)
SL3-500 **SL3-750** **SL3-001K** **SLM3-200** **SLM3-500**	1/2" (12mm) to 5/8" (16mm)	200 in.-lbs (22.5N•m)
SL3-002K **SL3-003K** **SLM3-001K**	1/2" (12mm) to 5/8" (16mm)	800 in.-lbs (90N•m)
SL3-005K **SLM3-002K**	5/8" (16mm) to 3/4" (19mm)	1000 in.-lbs (113N•m)

Table 3-1. Thread Engagement and Torque

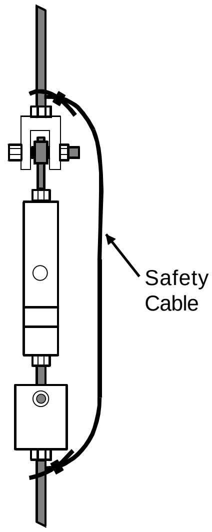


Figure 3-4. Installation Example

4. See Figure 3-4. Install a safety cable, connecting it above and below the Load Link assembly. Leave enough slack in the cable to allow free movement of the Load Link.
5. **For three- and four-point installations**:
   A. Repeat Steps 3 and 4 to install the remaining Load Links.
   B. Complete installation by installing field wiring and leveling the vessel as described below. [After leveling vessel, install safety wires on any screw connections (shackles, etc.), to prevent the hardware from coming loose.]
6. **For single-point installations**: Install safety wires on any screw connections (shackles, etc.) to prevent the hardware from coming loose.

Mounting Junction Box

Note

Mounting hardware for the junction box is not supplied by K-M. K-M recommends:
- Plastic box — #8-32 socket head cap screws and flat washers
- Stainless steel box — $^1/_4$-20 stainless steel hex head bolt and nut, $^1/_4$" stainless steel washer and lock washer.

The instructions below reflect these recommendations.

1. Plastic junction box — Remove the cover.
2. See Figure 3-5 or 3-6, as applicable. Hold the junction box at the desired mounting location, ensuring it is close enough to the Load Link(s) to allow a drip loop in the Load Link cable. Mark the mounting holes.

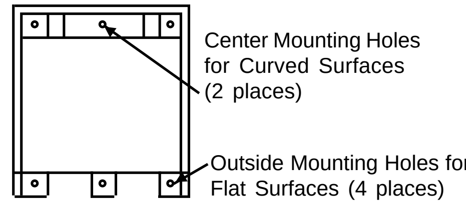


Figure 3-5. Plastic (non-trimming) Junction Box Mounting

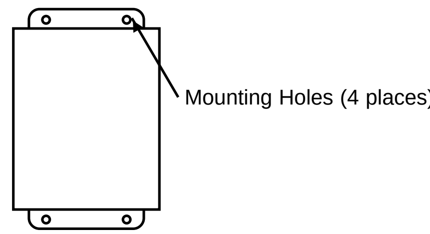


Figure 3-6. Stainless Steel (trimming) Junction Box Mounting

3. Drill and tap the mounting holes:
   - Plastic Box — #29 drill bit, #8-32 tap
   - Stainless Steel Box — #7 drill bit, $^1/_4$-20 tap
4. Mount the junction box with recommended hardware. Tighten until snug.
5. Plastic junction box — Replace the junction box cover if not ready to begin wiring, to ensure no moisture enters the junction box.

Wiring Load Links to Junction Box

The junction box accommodates up to four Load Links from one vessel. However, multiple junction boxes may be required for multi-point installations if all the Load Link cables cannot reach one box. The two types of junction boxes are described below:

- **Plastic junction box, non-trimming** — The four *small* holes in the bottom are for wiring Load Links to the junction box.
- **Stainless steel summing junction box, trimming** — This is used for highest accuracy applications, where trimming is required. The four holes in the sides are for wiring Load Links to the junction box.

Procedures are provided below for wiring both types of junction box:

Plastic Junction Box

1. Remove the junction box cover.
2. See Figure 3-7. Place a plastic washer on the watertight fitting. Thread the Load Link cable through a cap and watertight fitting. Leave an adequate length of cable between the Load Link and fitting to provide a drip loop.
3. Spread a generous bead of sealant around the watertight fitting's threads.

CAUTION

Only use Sikaflex 1A polyurethane sealant or Dow Corning RTV 739 or RTV 738. Other sealants may contain acetic acid, which is harmful to sensors and electronics.

4. In the bottom of the junction box, locate one of the four small holes closest to the terminal you will be using for that Load Link. Screw the fitting into the hole.
5. See Figure 3-8. Connect the Load Link wires to a terminal (TB2, TB3, TB4, or TB5).
6. Tighten the fitting cap to seal the openings.
7. Perform Steps 2 through 6 for each Load Link you wire to this junction box (up to four).
8. Spread a generous bead of sealant (Sikaflex 1A polyurethane sealant or Dow Corning RTV 739 or RTV 738) around the threads of the plug for each small hole in the junction box not being used. Screw a plug into each small hole.
9. Replace the junction box cover and screws if not ready to begin wiring the junction boxes/signal processor together, to ensure no moisture enters the box.

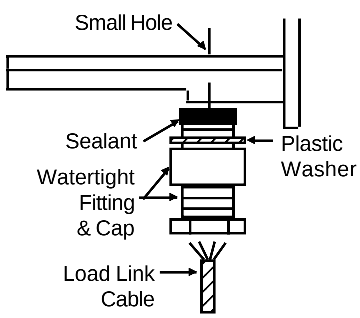


Figure 3-7. Inserting Load Link Cable through Watertight Fitting (Plastic Junction Box)

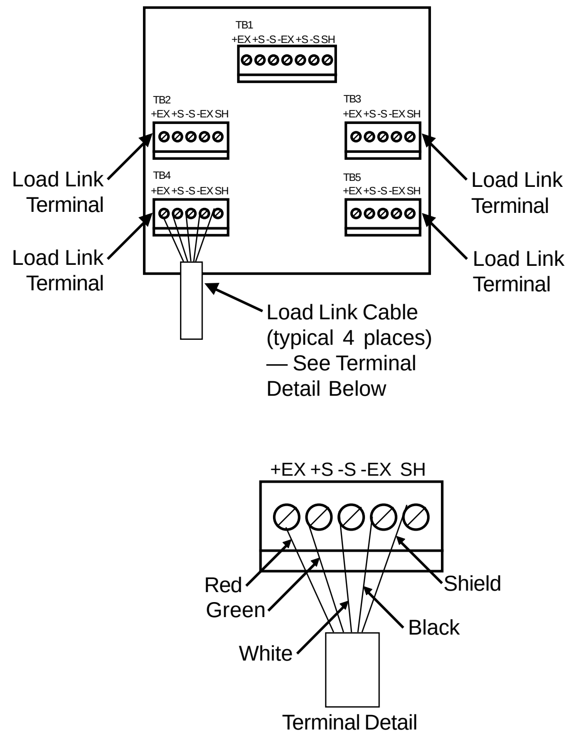


Figure 3-8. Wiring Load Links to Plastic Junction Box

Stainless Steel Junction Box

1. Open the junction box cover.
2. See Figure 3-9. Thread the Load Link cable through a fitting in the side of the box closest to the terminal you will be using for the Load Link. Leave an adequate length of cable between the Load Link and fitting to provide a drip loop.
3. Connect the wires from the Load Link to the terminal.
4. Perform Steps 2 and 3 for each Load Link you wire to this junction box (up to four).
5. Tighten the choker fittings to seal the openings.
6. Close the junction box cover if not ready to begin wiring the junction boxes/signal processor together, to ensure no moisture enters the box.

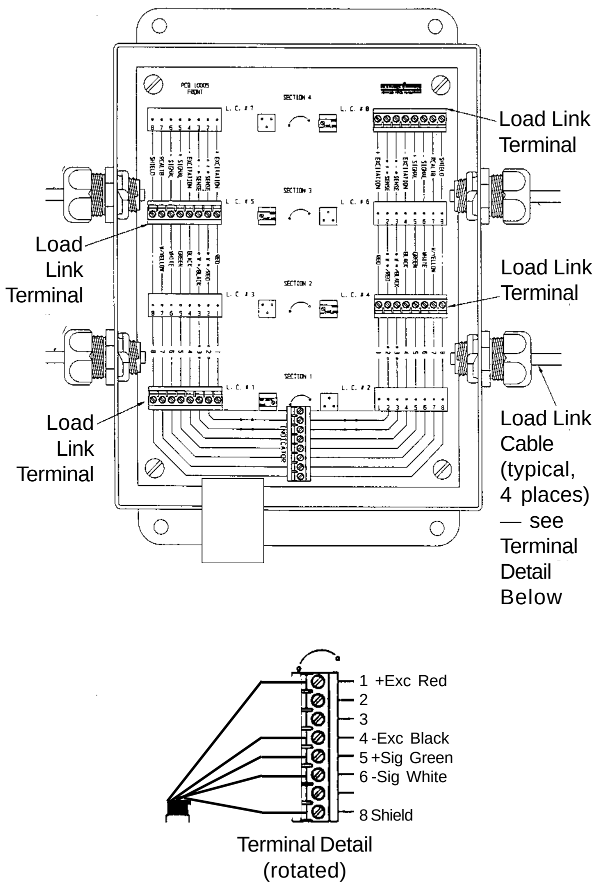


Figure 3-9. Wiring Load Links to Stainless Steel Junction Box

Wiring Junction Boxes Together and to Signal Processor

The fittings for wiring junction boxes to the other junction boxes and signal processor are described below:

- **Plastic junction box, non-trimming** — There are two versions of the plastic junction box enclosure. The enclosure has one or two large holes in the bottom:
  1. One large hole (conduited installation) — The large hole accommodates a $^{3}/_{4}$" conduit fitting.
  2. Two large holes (non-conduited installation) — The two large holes are equipped with PG13.5 cable fittings.
- **Stainless steel summing junction box, trimming** — The hole in the bottom accommodates a $^{1}/_{2}$" conduit fitting.

Notes

1. K-M recommends the use of conduit for wiring the junction box to other junction boxes and signal processor. K-M requires the use of cable trays for non-conduited installations.
2. The procedure below assumes the conduit/cable tray has been installed.
3. Seal all conduit fittings against water entry. Install drain holes at conduit/ cable tray lowest elevation(s) to allow condensation to drain.
4. To wire junction boxes together and to the signal processor, use Belden 83556 22-gage 6-conductor shielded interconnect cable or equivalent. For lengths over 200' (61m) length, consult K-M.
5. When wiring cable to terminals, strip back 3" (76mm) of cable sheathing to expose the wires inside. Strip $^{1}/_{4}$" (6mm) of insulation from the end of each of the conductor wires.
6. All wiring routed between junction boxes and signal processor must be continuous (no splices).

1. Remove/open the junction box cover.
   - Conduited installation — Install conduit fitting in the bottom of the junction box.
   - Non-conduited installation — See Figure 3-10. Spread a generous bead of sealant around the sides of the PG13.5 cable fittings. Install the fittings in the two large holes in the bottom of the junction box.

CAUTION

Only use Sikaflex 1A polyurethane sealant or Dow Corning RTV 739 or RTV 738. Other sealants may contain acetic acid, which is harmful to sensors and electronics.

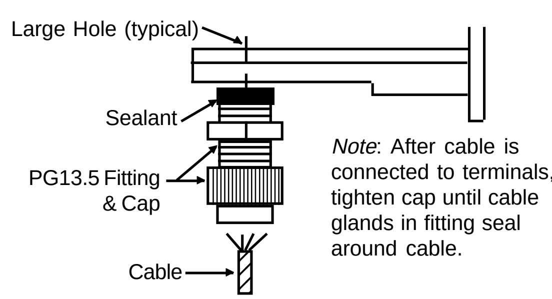


Figure 3-10. Inserting Interconnect Cable through PG13.5 Fitting and Cap

2. See Figure 3-11. Route the cable through the fitting into the junction box farthest from the signal processor. Connect wires from the cable to the output terminal (TB1 in plastic junction box, 'Indicator' in stainless steel junction box) .
3. Route the cable through conduit/cable tray to the next junction box. Estimate the required length of cable to the terminal strip, allowing a little extra for strain relief. Cut the excess cable. Connect wires from the cable to the output terminal.
4. Route another cable through the fitting into this junction box, and attach wires to the output terminal.
5. Repeat Steps 3 and 4 until all junction boxes for the vessel are wired together.
6. Route the cable from the last junction box through conduit/cable tray to the signal processor. Refer to the signal processor manual for wiring the junction box to the signal processor. One vessel takes up one channel in the signal processor — the channel shows the average value from all the Load Links supporting the vessel.

Note

Ground the cable shield only at the signal processor.

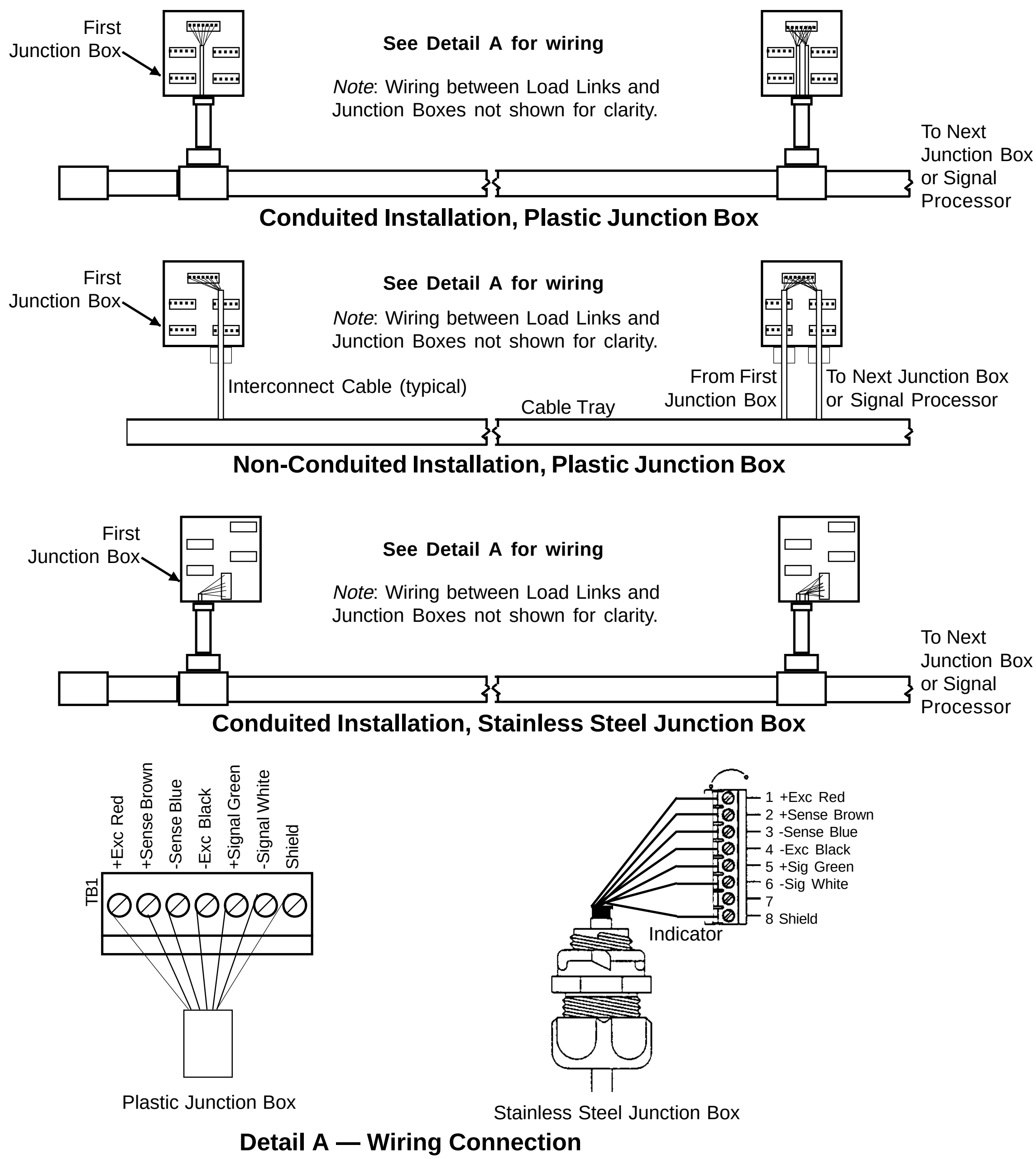


Figure 3-11. Wiring Junction Boxes Together

Leveling Vessel (multi-point support installation)

Leveling the vessel distributes the weight evenly on all the Load Links, increasing system accuracy. Perform this procedure while the vessel is still empty:

1. Check if Leveling Needed

A. Disconnect the +Sig and -Sig wires for all Load Links.

B. Using the DMM, measure and record the *dead weight* voltage output across one Load Link's +Sig and -Sig leads. The output must be positive. If you observe a negative output:

(1) Check the wiring. Ensure the wires are connected to the correct terminals.

(2) If the wiring is correct and you still observe a negative output, the vessel may be tilted. Vessel tilting shifts the load onto some Load Links while putting other Load Link(s) in a no-load or compression load condition. This can occur in cases of unequal support length, unequal support beam stiffness, or extreme thermal deformation. Proceed to Step 2 to level the vessel.

C. Repeat Step B for each Load Link.

D. Calculate the output range:
Output Range =
largest output - smallest output
The output range must be less than 5% of rated output. For a system with 10 V excitation, the output range must be less than 1.5 mV (3.0 mV/V x 10 V x 0.05 = 1.5 mV).
In the example in Figure 3-12, Load Links 1, 2, and 4 meet this requirement, while Load Link 3 does not.

E. If the installation meets the criteria described above (each output is positive and output range is less than 1.5 mV), the vessel is sufficiently level.
- If sufficiently level, proceed to Step 3.
- If not sufficiently level, proceed to Step 2 to level the vessel.

2. Level Vessel

A. Loosen the connections between the Load Links and the vessel.

B. Use the turnbuckle or adjust the cable/chain/rod length as required to adjust the weight distribution on the Load Links. Shortening the support length increases the weight on the Load Link. Lengthening the support length decreases the weight on the Load Link.

Note

Adjusting support length on one Load Link affects the weight distribution on all the Load Links.

C. Re-tighten the connections between the Load Links and the vessel.

D. Repeat Step 1, rechecking the voltage output of all the Load Links and recalculating the Output Range (largest output - smallest output).

E. Repeat Steps 2A through 2D until the installation meets the criteria for weight distribution.

3. Complete Installation

A. Reconnect the +Sig and -Sig wires for all Load Links to the junction box terminals.

B. Install safety wires on any screw connections (shackles, etc.) to prevent the hardware from coming loose.

Load Link #	Dead Weight Output (mV)
1	+5.75
2	+6.00
3	+3.30
4	+6.15

Maximum allowable output range = 1.5 mV (for 10 V excitation)
Actual output range = #4 Output - #3 Output = 6.15 mV - 3.30 mV = 2.85 mV

All Load Links meet the requirement that all output changes must be positive (+). Load Links 1, 2, and 4 meet the requirement that the output be within a 1.5 mV range. Load Link 3 does not meet the requirement, and its small output indicates it is carrying much less weight than the other Load Links. The vessel must be leveled to distribute the weight more evenly over all the Load Links.

Figure 3-12. Example Recording and Analysis of Output for Level Check

Trimming Output (multi-point support installation)

Trimming equalizes the output from all Load Links supporting the vessel. Trimming is necessary if a high accuracy weighing system is required. Note that only the stainless steel summing junction box has trimming capability.

Perform this procedure while the vessel is still empty:

1. Disconnect the +Sig and -Sig wires for all Load Links.
2. Turn all trim pots counter-clockwise to the maximum excitation setting.
3. Hang a calibrated test weight off of one Load Link, as close to the Load Link support point as possible. As a minimum, use a test weight equal to 25% of the rated load for one Load Link. The larger the test weight, the more accurate the system.

CAUTION

The test weight plus the dead weight supported by the Load Link must not exceed the Load Link's rated load.

4. Using the DMM, measure and record the voltage output across that Load Link's +Sig and -Sig leads.
5. Remove the test weight.
6. Repeat Steps 3 through 5 for each Load Link for this vessel.
7. See Figure 3-13. Reviewing the recorded voltage outputs, determine which Load Link has the lowest output. **Do not adjust the trim for this Load Link.**
8. For each of the remaining Load Links:
   A. Hang the calibrated test weight off of the Load Link, at the same position as in Step 3.
   B. Using the DMM, measure the voltage output across that Load Link's +Sig and -Sig leads while adjusting the corresponding trim pot. Adjust the trim pot until the voltage output matches the lowest output (from Step 7).
   C. Remove the test weight.
   D. Repeat Steps A through C for each of the remaining Load Links.
9. Reconnect the +Sig and -Sig wires for all Load Links to the junction box terminals.

Load Link #	Output with Test Weight (mV)
1	+6.95
2	+6.00
3	+6.60
4	+6.15

Load Link #2 has the lowest output. Do not adjust the trim for Load Link #2. Using the calibrated test weight, adjust the trim for each of the other Load Links until they have output of 6.00 mV.

Figure 3-13. Example Recording and Analysis of Output for Trimming

Chapter 4. System Calibration

Introduction

This chapter describes general procedures for calibrating the Load Link III system. Before calibrating, you must install a signal processor. Refer to the signal processor manual for the procedures to input calibration parameters.

There are two calibration methods:

- Live Load calibration — set lo span and hi span while moving material into or out of the vessel. This is the preferred method.
- Manual calibration — set scale factor counts, scale factor weight, and zero calibration value without moving material.

Live Load calibration requires you to move a known quantity of material into or out of the vessel while performing the procedure. The quantity of material moved must be *at least* 25% of the vessel's total capacity to provide best accuracy. Live Load calibration is also based on the material weight currently in the vessel.

Manual calibration allows you to start using the system as soon as Load Links, junction boxes, and signal processor are installed and wired, even if you cannot move any (or enough) material now. Manual calibration values are based on system parameters, including sensor sensitivity, rated load, and signal processor A/D converter sensitivity. These values are known, can be calculated, or can be obtained from the signal processor. Manual calibration is also based on the material weight currently in the vessel.

Note that manual calibration does not take into account the *actual* response to changes in weight. Theoretically, a change in weight results in a proportional change in digital counts. However, the structure's actual response to weight and interaction with piping, catwalks, roof, discharge chutes, etc. prevents the system from achieving theoretical values. Manual calibration is a good start, but to obtain the highest accuracy, perform a Live Load calibration when scheduling permits you to move material into or out of the vessel.

The following sections provide procedures for performing Live Load and Manual calibrations.

Live Load Calibration

Live Load calibration can be performed by adding **or** removing a known quantity of material from the vessel. The quantity of material moved must be at least 25% of the vessel's total capacity. The procedures for both Live Load calibration methods follow.

Note

Refer to the signal processor manual to input *Lo Span* and *Hi Span*.

Adding Material

See Figure 4-1:

1. Record the current live load.
2. Input *Lo Span*:
   Lo Span = current live load
3. Add known quantity of material to the vessel. Ensure all material has stopped moving before proceeding.
4. Input *Hi Span*:
   Hi Span = *Lo Span* + Added Weight

Example: You are using three 5,000 lb capacity Load Links to monitor a vessel. The vessel is empty (contains 0 lbs of material). The vessel can hold a maximum of 10,000 lbs. You plan to add 3,000 lbs of material (>25% of 10,000 lbs) to the vessel. Following the Live Load calibration procedure:

1. Current live load = 0 lbs
2. *Lo Span* = current live load = 0 lbs
3. Add 3,000 lbs of material.
4. *Hi Span* = *Lo Span* + Added Weight
   = 0 lbs + 3,000 lbs = 3,000 lbs

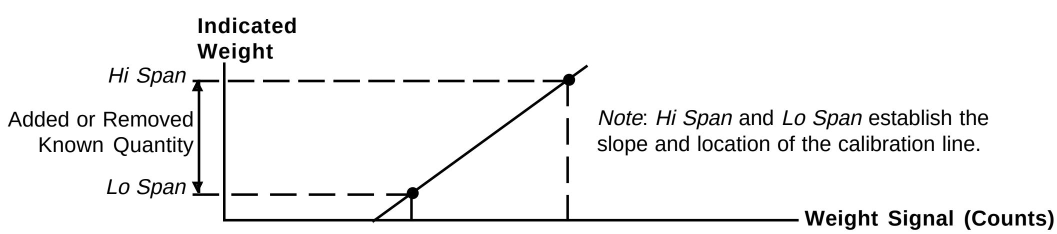


Figure 4-1. Live Load Calibration by Adding or Removing a Known Quantity of Material

Removing Material

See Figure 4-1.

1. Record the current live load.
2. Input *Hi Span*:
   Hi Span = current live load
3. Remove known quantity of material from the vessel. Ensure all material has stopped moving before proceeding.
4. Input *Lo Span*:
   Lo Span = *Hi Span* – Removed Weight

Example: You are using three 5,000 lb capacity Load Links to monitor a vessel. The vessel currently contains 4,000 lbs of material. The vessel can hold a maximum of 10,000 lbs. You plan to remove 3,000 lbs of material (>25% of 10,000 lbs) from the vessel. Following the Live Load calibration procedure:

1. Current live load = 4,000 lbs
2. *Hi Span* = current live load = 4,000 lbs
3. Remove 3,000 lbs of material.
4. *Lo Span* = *Hi Span* – Removed Weight
   = 4,000 lbs – 3,000 lbs = 1,000 lbs

Manual Calibration

Note

K-M's SVS 2000™ signal processor performs a manual calibration automatically, with *Quick Config*.

See Figure 4-2:

1. Refer to the signal processor manual to determine how to obtain the A/D converter sensitivity, expressed in Counts/mV. Record this value.
2. Record the Rated Load for one Load Link.
3. From the calibration certificate that came with each Load Link, record the Load Link sensitivity (S) for each Load Link. The sensitivity has units of mV/V. Calculate and record the average sensitivity if the system has multiple Load Links.
4. Record the excitation voltage for the system (typically 10 V).
5. Record the current live load in the vessel.
6. Calculate the Manual calibration values:
   Scale Factor Weight
   = Rated Load (lbs or kg) x Number of Supports
   Scale Factor Counts
   = S (mV/V) x Excitation Voltage (V) x Counts/mV
   Zero_Cal = current live load (lbs or kg)
7. Refer to the signal processor manual to input *Scale Factor Weight*, *Scale Factor Counts*, and *Zero_Cal*.

Example: You are using three 5,000 lb capacity Load Links to monitor a vessel. The vessel is empty (contains 0 lbs of material). Following the Manual calibration procedure:

1. Counts/mV = 13421 (from signal processor)
2. Rated load for one Load Link is 5,000 lbs.
3. From the three calibration certificates:
   S_1 = 3.003 S_2 = 3.001 S_3 = 2.998
   S (average) = (3.003+3.001+2.998)/3 = 3.001 mV/V
4. Excitation Voltage = 10 V
5. Current live load = 0 lbs
6. Calculate the values for the calibration:
   Scale Factor Weight =
   Rated Load x Number of Supports
   = 5,000 lbs x 3 = 15,000 lbs
   Scale Factor Counts
   = S x Excitation Voltage x Counts/mV
   = 3.001 mV/V x 10 V x 13421 cnts/mV
   = 402,764 Counts
   Zero_Cal = current live load = 0 lbs

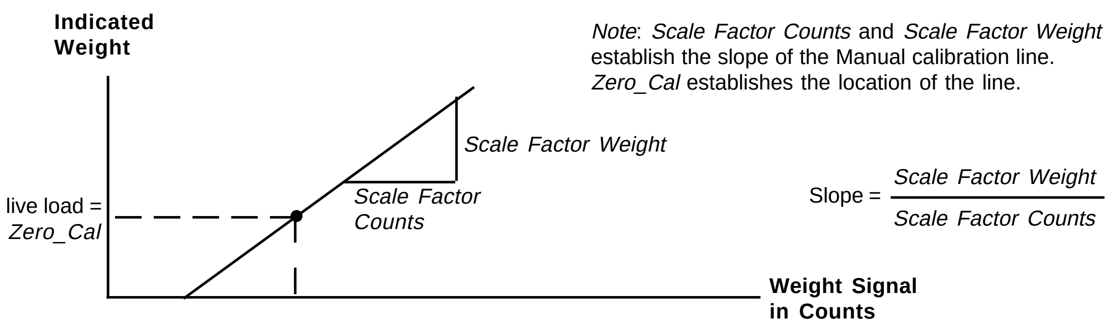


Figure 4-2. Manual Calibration Line

Chapter 5. Troubleshooting

This chapter describes some common problems. For each problem, one or more possible explanations are listed. For each explanation, an indication of when the problem is likely to be noticed and suggested solutions are provided.

Problem 1. Small Amplitude Changes or Erratic Fluctuations in Display Readings

Explanation

Small amplitude drift or oscillation, with peak-to-peak disturbance of 0.1% to 0.3% of full scale, is normal.

Problem Likely to be Noticed
Shortly after initial installation.

Solution
Reduce drift or oscillation by setting 'count by' and 'averaging' appropriately on the signal processor (refer to signal processor manual).

Explanation

Fluctuations can be caused by mechanical binding in supports. Binding may have resulted from hanging equipment on vessel after initial Load Link installation.

Problem Likely to be Noticed
Shortly after initial installation **or** on system that previously functioned correctly.

Solution
Check for binding in eye nuts, shackles, etc. If necessary, re-level vessel (refer to *Leveling Vessel* in Chapter 3, Hardware Installation).

Explanation

Fluctuations can be caused by moisture in cable conduit, junction boxes, or PCBs.

Problem Likely to be Noticed
On system that previously functioned correctly.

Solution
Check conduit, junction boxes, and PCBs for water contamination. Find water entry source and correct problem. Dry with a hair drier. Remove/replace corroded parts and materials.

CAUTION

> If using sealant to eliminate water entry, **use Sikaflex 1A polyurethane sealant or Dow Corning RTV 739 or RTV 738**. Other sealants may contain acetic acid, which is harmful to sensors and electronics.

Explanation

Fluctuations can be caused by a damaged Load Link.

Problem Likely to be Noticed
Shortly after initial installation **or** on system that previously functioned correctly.

Solution
Using a DMM, check resistance for individual Load Links:

1. Remove one Load Link's wires from junction box terminal.
2. Measure Load Link resistances and verify they meet these requirements:

Leads	Range
-Exc and +Exc	346.5 - 400 ohms
-Sig and +Sig	346.5 - 353.5 ohms
-Sig and -Exc +Sig and -Exc	Within 1 ohm of each other
-Sig and +Exc +Sig and +Exc	Within 1 ohm of each other

   If any reading is outside specifications, Load Link is damaged and must be replaced.
3. Repeat Step 2 for each suspect Load Link, until damaged Load Link is located.

Explanation

Fluctuations can be caused by a short to ground.

Problem Likely to be Noticed
Shortly after initial installation **or** on system that previously functioned correctly.

Solution
Using a DMM, check for shorts to ground:

1. Set DMM resistance scale to accommodate maximum measured range.
2. Disconnect junction box cable from signal processor.
3. With one lead to earth ground, place other lead on a wire from disconnected cable and check resistance. Repeat for each wire in cable.
   - If any reading is less than infinite (i.e., there is resistance), short is indicated; proceed to Step 4 to identify location.
   - If no short is indicated, investigate other explanations for problem.
4. Starting with junction box closest to signal processor in daisy chain, disconnect cable that connects junction box to other junction boxes. With one lead to earth ground, place other lead on a wire from disconnected cable, and check resistance. Repeat for each wire in cable.
   - If any reading is less than infinite, short is indicated; proceed to Step 5 to identify location.
   - If no short is indicated, proceed to next junction box in daisy chain. Disconnect cable connecting it to other junction boxes and check resistances. Repeat for each junction box down chain until short is located; proceed to Step 5.
5. Disconnect cable for one Load Link from identified junction box. With one lead to earth ground, place other lead on a wire from Load Link cable and check resistance. Repeat for each wire in cable.
   - If any reading is less than infinite, short is indicated. Replace shorted Load Link.
   - If no short is indicated, disconnect another Load Link cable from junction box and check resistances. Repeat for each Load Link wired to junction box until short is located. Replace shorted Load Link.

Explanation

Fluctuations can be caused by problems with signal processor.

Problem Likely to be Noticed
Shortly after initial installation **or** on system that previously functioned correctly.

Solution
Check signal processor excitation voltage and incoming AC voltage for accuracy and stability (refer to signal processor manual).

Problem 2. Repeatable Drift over 24-hour Period

Explanation

Periodic drift is most likely caused by vessel thermal expansion due to the sun's radiation or a vessel's response to its own heating cycles.

Problem Likely to be Noticed
Shortly after initial installation **or** on system that functioned correctly in cool or overcast weather.

Solution

1. If periodic drift is outside specifications (Appendix A*),* contact K-M.
2. If keeping long-term records, take readings at same time each day to minimize error.

Problem 3. Sudden Change in Display Reading or Frequent Recalibration Required

Explanation

A single broken Load Link can cause indicated weight to shift up or down by a large amount, up to 100% of full-scale live load.

Problem Likely to be Noticed
On system that previously functioned correctly.

Solution
Using a DMM, check voltage output for individual Load Links:

1. Remove one Load Link's +Sig and -Sig wires from junction box terminal.
2. Measure voltage across Load Link's +Sig and -Sig leads. Verify output is within ±30 mV. (Assuming 10 V excitation).
3. Repeat Steps 1 and 2 for each suspect Load Link. If any reading is outside specified range, Load Link may be damaged; check Load Link resistance to verify (see Problem 1).

Explanation

Change in weight reading can be caused by material buildup on Load Link's horizontal surfaces.

Problem Likely to be Noticed
On system that previously functioned correctly.

Solution
Remove material from Load Link's horizontal surfaces.

Explanation

Sudden change in weight reading can be caused by problems with signal processor.

Problem Likely to be Noticed
Shortly after initial installation **or** on system that previously functioned correctly.

Solution
Check signal processor excitation voltage and incoming AC voltage for accuracy and stability (refer to signal processor manual).

Appendix A. Product Specifications

Overload Rating

Functional Integrity. ±150% of Rated Capacity
Mechanical Integrity. ±400% of Rated Capacity

Input

Excitation Voltage. Recommended: 10 VDC; Maximum 15 VDC
Input Resistance. 350 + 50/-3.5 Ohms

Output

Non-linearity. ±0.05% of Rated Output
Hysteresis. ±0.03% of Rated Output
Non-repeatability. ±0.02% of Rated Output
Creep (after 20 minutes). ±0.03% of Rated Output (determined at rated capacity; performance at reduced loads proportional to applied load)
Nominal Output. 3 mV/V ± 0.1%
Zero Balance. ±1% of Rated Output
Output Resistance. 350 ± 3.5 Ohms

Environmental

Operating Temperature Range. -65° to 200° F (-55° to 90° C)
Compensated Temperature Range. 0° to 150° F (-15° to 65° C)
Temperature Effect on Rated Output. ±0.08% of Reading/100° F (55.6° C)
Temperature Effect on Zero. ±0.15% of Reading/100° F (55.6° C)

Materials

SL3-050 through SL3-001K and SLM3-020 through SLM3-500. Anodized aluminum
SL3-002K through SL3-005K and SLM3-001K through SLM3-002K. Electroless nickel-plated steel

Insulation Resistance

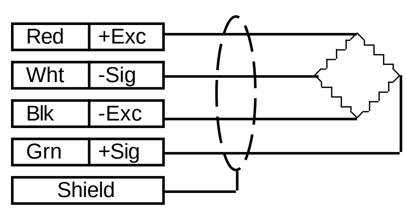
Bridge to Case. >5000 Megohms

Electrical Connections

SL3-050 through SL3-250 and SLM3-020 through SLM3-100.
Standard — 4-connector shielded cable (AWG28) 10 ft (3m) long.
Option — length up to 100 ft (30m).

SL3-500 through SL3-005K and SLM3-200 through SLM3-002K.
Standard — 4-connector shielded rugged cable (PVC Jacket AWG22) 10 ft (3m) long.
Option — length up to 100 ft (30m).

Cable (all models)	
Color	**Function**
Red	+Excitation
Green	+Signal
White	-Signal
Black	-Excitation
Shield	No Connection

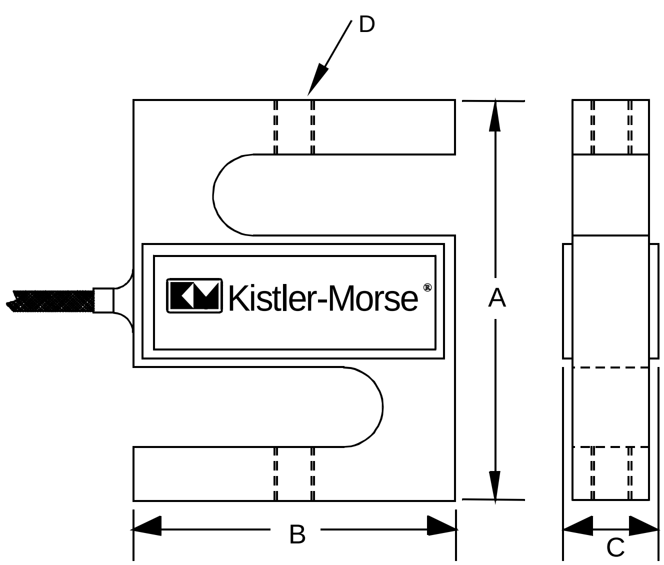


Capacities and Dimensions

See Table A-1.

Capacity/Dimensions

Model	Rated Capacity	A	B	C	D
SL3-050	50 lbs (22kg)	2 1/2 in. (64mm)	2 in. (51mm)	7/8 in. (22mm)	1/4-28 UNF-2B 1/4 deep, top and bottom
SL3-100	100 lbs (45kg)	2 1/2 in. (64mm)	2 in. (51mm)	3/4 in. (19mm)	1/4-28 UNF-2B 1/4 deep, top and bottom
SL3-250	250 lbs (113kg)				
SL3-500	500 lbs (227kg)	3 in. (76mm)	2 in. (51mm)	1 1/4 in. (32mm)	1/2-20 UNF-2B 1/2 deep, top and bottom
SL3-750	750 lbs (340kg)				
SL3-001K	1000 lbs (454kg)				
SL3-002K	2000 lbs (907kg)				
SL3-003K	3000 lbs (1361kg)				
SL3-005K	5000 lbs (2268kg)	3 1/2 in. (89mm)	2 1/2 in. (64mm)	1 3/4 in. (44mm)	5/8-18 UNF-2B 5/8 deep, top and bottom
Metric Units					
SLM3-020	20kg	64mm	51mm	22mm	M6x1 6H, top and bottom
SLM3-050	50kg	64mm	51mm	19mm	M6x1 6H, top and bottom
SLM3-100	100kg				
SLM3-200	200kg	76mm	51mm	32mm	M12x1.75 6H, top and bottom
SLM3-500	500kg				
SLM3-001K	1000kg				
SLM3-002K	2000kg	89mm	64mm	44mm	M16x2 6H, top and bottom



Note: Install the Load Link III with the Kistler-Morse label right side up.

Table A-1. Load Link III Capacities and Dimensions

Appendix B. Kistler-Morse Service

Product Warranty

A complete, unabridged copy of our product warranty is available upon request from Kistler-Morse. A summary of the warranty, *subject to the terms and conditions listed fully in the warranty*, follows:

> K-M warrants the equipment to be free from defects in material and workmanship for one year from date of shipment to original user. K-M will replace or repair, at our option, any part found to be defective. Buyer must return any part claimed defective to K-M, transportation prepaid.

Service

K-M maintains a fully trained staff of field service personnel who are capable of providing you with complete product assistance. Our field service staff is based in Bothell, Washington USA (corporate headquarters) and Antwerp, Belgium (European office).

Phone Consultation

Our Field Service staff provides the following services by telephone, via our regular and toll free number (toll free in USA and Canada only):

- Technical, application, and troubleshooting assistance
- Spare parts assistance
- Warranty (replacement) assistance

On-Site Consultation

K-M's Field Service staff can provide additional services at your request. Contact K-M at the closest office for rate and scheduling information for the following services:

- Technical, application, startup, and troubleshooting assistance on-site
- Training on-site or at our corporate office
- Service calls
- Equipment updates to our latest configuration

General descriptions of some of these standard services follow. Of course, if your service needs vary from those described, we are available to discuss them with you.

Installation, Startup Assistance, and On-Site Training

Note

> Load Link installation, field wiring, conduit installation, and junction box and signal processor mounting must be performed by the customer. The AC power must be connected to the signal processor, but not energized, prior to K-M beginning work.

The system will be powered up and checked for proper electrical operation. For best results, K-M requires moving a known amount of material, such as a truckload, for Live Load calibration. Live Load calibration will be performed if actual material or weight devices can be moved. If it is not possible to move material, a Manual calibration will be performed. Recommendations for the optimal performance of the system will be provided.

On-site training will include simulation of the Live Load calibration process (if Live Load calibration can not be performed while K-M is on site) and instruction covering operation and maintenance of the system.

Troubleshooting

K-M will troubleshoot systems for mechanical, electrical, calibration, and wiring errors. Normal component repairs will be made and wiring errors will be corrected, including replacement of non-repairable printed circuit boards.

Service Calls

K-M will perform on-site repair/replacement services.

Return Material Authorization

If a part needs to be sent to the factory for repair, contact K-M's corporate office and request a Return Material Authorization (RMA) number. The RMA number identifies the part and the owner and must be included with the part when it is shipped to the factory.

Address and Telephone Numbers

Corporate Office

Kistler-Morse Corporation
19021 120th Avenue NE
Bothell, WA 98011-9511

Telephone: 425-486-6600
Toll Free (U.S.A. and Canada): 800-426-9010
Fax: 425-402-1500
www.kistler-morse.com

European Office

Kistler-Morse Corporation
Rucaplein 531
B-2610 Antwerp, Belgium

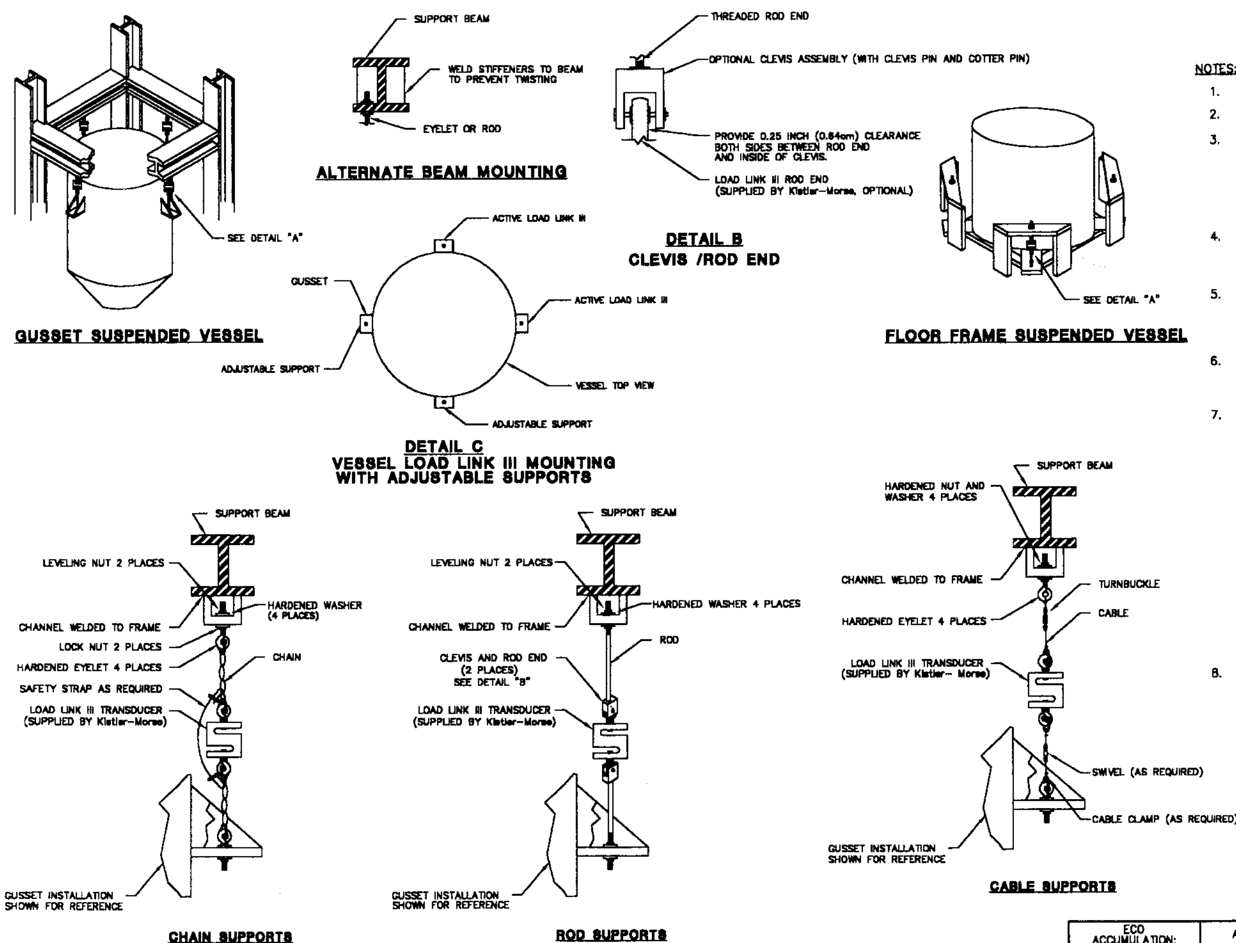
Telephone: 32.3.218.99.99
Fax: 32.3.230.78.76

Appendix C. Technical Drawings

This appendix contains the following technical drawings for the Load Link III:

Drawing No.	**Drawing Title**
TI-LC.SCELL-01	Load Link III Transducer Installation Details and General Layout
TI-LC.SCELL-02	Load Link III Transducer Interconnect Details

REVISIONS					
LTR	DESCRIPTION	INCORP.	CHECKED	APPROVED	DATE
NEW	INITIAL RELEASE				



DETAIL A
TYPICAL MOUNTING ARRANGEMENTS

NOTES:

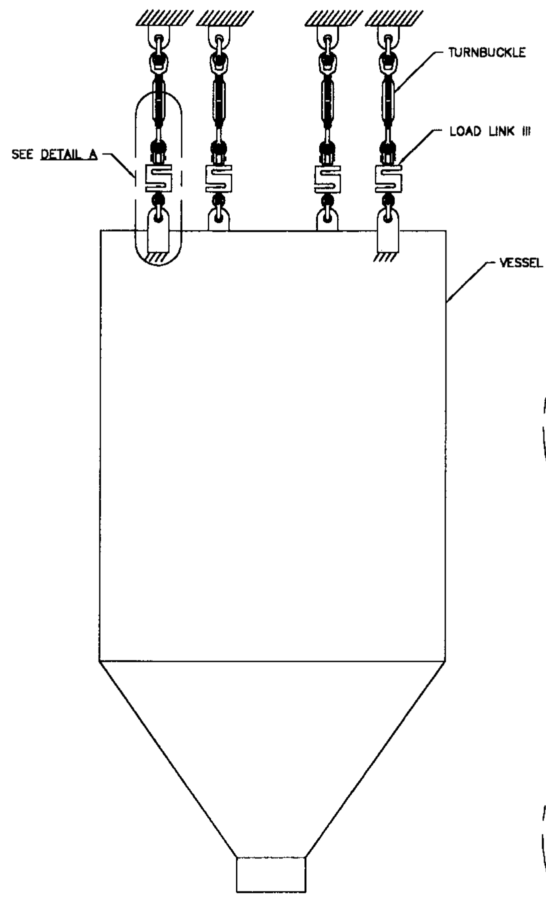
1. ALL PARTS SUPPLIED BY CUSTOMER UNLESS OTHERWISE NOTED.
2. FOR WIRING, ROUTING, AND LAYOUT SUGGESTIONS, SEE -02 SHEETS 1 AND 2.
3. USE PROPER SAFETY PRECAUTIONS WHEN LIFTING AND SUPPORTING VESSEL. EMPTY VESSEL BEFORE INSTALLING TRANSDUCERS. DO NOT DROP VESSEL WHEN IT IS ATTACHED TO THE LOAD LINK III TRANSDUCERS AS THE EXCESSIVE SHOCK LOADS GENERATED MAY DAMAGE THE TRANSDUCERS. DO NOT HANG THE TOTAL WEIGHT OF THE VESSEL ON ONE LOAD LINK III DURING INSTALLATION SENSOR INTEGRITY IS 1.5 TIMES ITS RATED CAPACITY.
4. IF THE VESSEL FOUNDATION/GUSSET SUPPORT BEAMS FLEX OR TWIST, VESSEL LOADS MAY SHIFT WHICH COULD CAUSE MEASUREMENT ERRORS. INSTALL BRACES AND STIFFENERS AS REQUIRED.
5. THE LOAD LINK III TRANSDUCERS AND SUPPORTS SHOULD HANG VERTICALLY FOR THE BEST ACCURACY. INSTALL SWIVELS ON TRANSDUCER SUPPORTS AS REQUIRED TO PREVENT TORQUE FROM BEING APPLIED TO THE TRANSDUCER. USE CHECK RODS AS REQUIRED TO PREVENT VESSEL FROM SWINGING DURING WEIGHING.
6. IF A COMBINATION OF LOAD LINK III TRANSDUCERS AND ADJUSTABLE SUPPORTS ARE USED, INSTALL TRANSDUCERS ON ADJACENT VESSEL SUPPORT GUSSETS. NOT DIAGONAL FROM EACH OTHER, PER DETAIL C.
7. ADJUST THE TENSION ON THE LOAD LINK III TRANSDUCERS USING THE LEVELING NUTS/TURNBUCKLES TO COMPENSATE FOR VESSEL/GUSSET HEIGHT VARIATIONS. USE SAFETY WIRE, LOCTITE, OR OTHER SUITABLE MEANS TO PREVENT TURNBUCKLES, ADJUSTMENT NUTS, AND LOAD LINK III TRANSDUCER CLEVIS/ROD ENDS FROM LOOSENING. MAKE SURE THE VESSEL IS EMPTY OR ITS CONTENT IS DISTRIBUTED. FOR BEST RESULTS, THE NUMBER OF ADJUSTABLE SUPPORTS SHOULD BE EQUAL TO HALF THE TOTAL NUMBER OF VESSEL SUPPORTS.
   a. WHEN INSTALLING MORE THAN ONE LOAD LINK III TRANSDUCER ON VESSEL: ADJUST THE TENSION SO THAT THE OUTPUT READING DIFFERENCE BETWEEN THE LOAD LINK III INSTALLED OUTPUTS IS +/- 1.5 mV OR LESS FROM EACH OTHER.
   b. WHEN INSTALLING ONLY ONE LOAD LINK III TRANSDUCER ON VESSEL: (FOR 2 OR 3 SUPPORTS ONLY) USE A BUBBLE LEVEL INDICATOR FOR LEVEL MONITORING AS YOU ADJUST THE TENSION ON ALL SUPPORTS UNTIL THE VESSEL IS LEVEL.
8. DISCHARGE CHUTES, PLUMBING CONNECTIONS, LADDERS, ETC. MAY CAUSE MEASUREMENT ERRORS BY SUPPORTING OR TRANSFERRING VESSEL WEIGHT TO OTHER STRUCTURES. INSTALL FLEXIBLE CONNECTIONS AS REQUIRED.

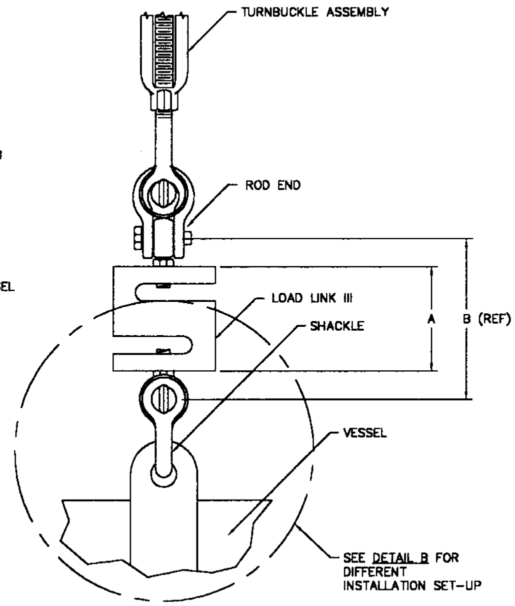
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ECO No. 1:	DRAWN: A.B.RIGOR	03/22/99	DECIMAL .X± NA .XX± NA .XXX± NA; ANGULAR ±NA
ECO No. 2:	CHECKED: A.B.R.	3/23/99	DO NOT SCALE DRAWING
ECO No. 3:	PROJ. ENGR.: A.B.R.	3/23/99	SCALE NA
ECO No. 4:	PRODUCTION:		FINISH NA
ECO NO. 5: INCORPORATE ABOVE ECO'S	PURCHASING:		USED ON: (REF ONLY) NA

Kistler-Morse Corp.
Bothell, WA 98011

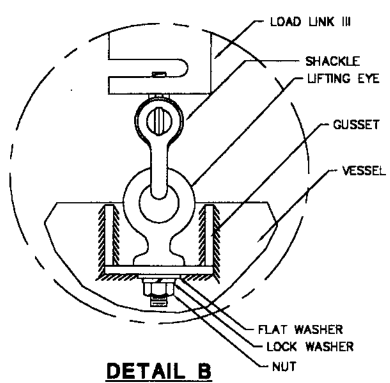
TITLE: LOAD LINK III TRANSDUCER INSTALLATION DETAILS AND GENERAL LAYOUT

SIZE	DWG. No.	REV.
B	TI-LC.SCELL-01	NEW
ACAD # I-SCELL1	DATE:3/22/99	SHT. 1 OF 2





DETAIL A



DETAIL B

NOTES: (UNLESS OTHERWISE SPECIFIED)

9. ALL SUPPORTING HARDWARE ACCESSORIES SUCH AS; SHACKLES, LIFTING EYES, TURNBUCKLES, CHAINS, RODS, CABLES, ETC., SHOULD HAVE THE SAME CAPACITY AS THE SENSOR OR BETTER.

10. DO NOT ANCHOR ONE END OF THE SENSOR RIGIDLY. BOTH ENDS MUST BE FREE TO MOVE. TORQUE, BENDING, OR TWISTING WILL CAUSE WEIGHING ERRORS OR DAMAGE THE SENSOR. SWIVELS MAY BE USED.

ENGLISH

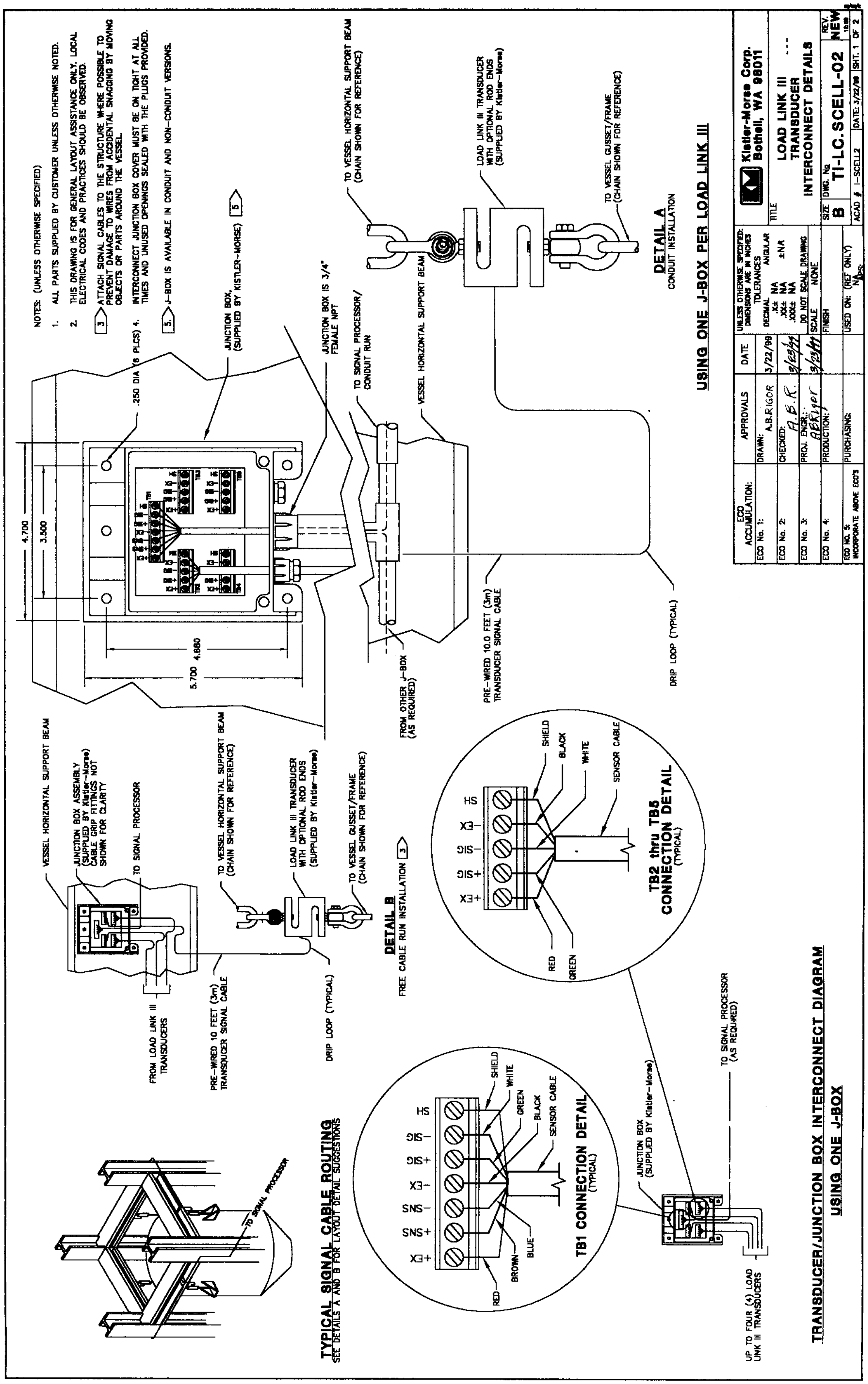
SENSOR CAPACITY	A	B
50 LB	2.5 in.	4.9 in.
100 LB	2.5 in.	4.9 in.
250 LB	2.5 in.	4.9 in.
500 LB	3.0 in.	7.0 in.
750 LB	3.0 in.	7.0 in.
1K LB	3.0 in.	7.0 in.
2K LB	3.0 in.	7.0 in.
3K LB	3.0 in.	7.0 in.
5K LB	3.5 in.	7.5 in.

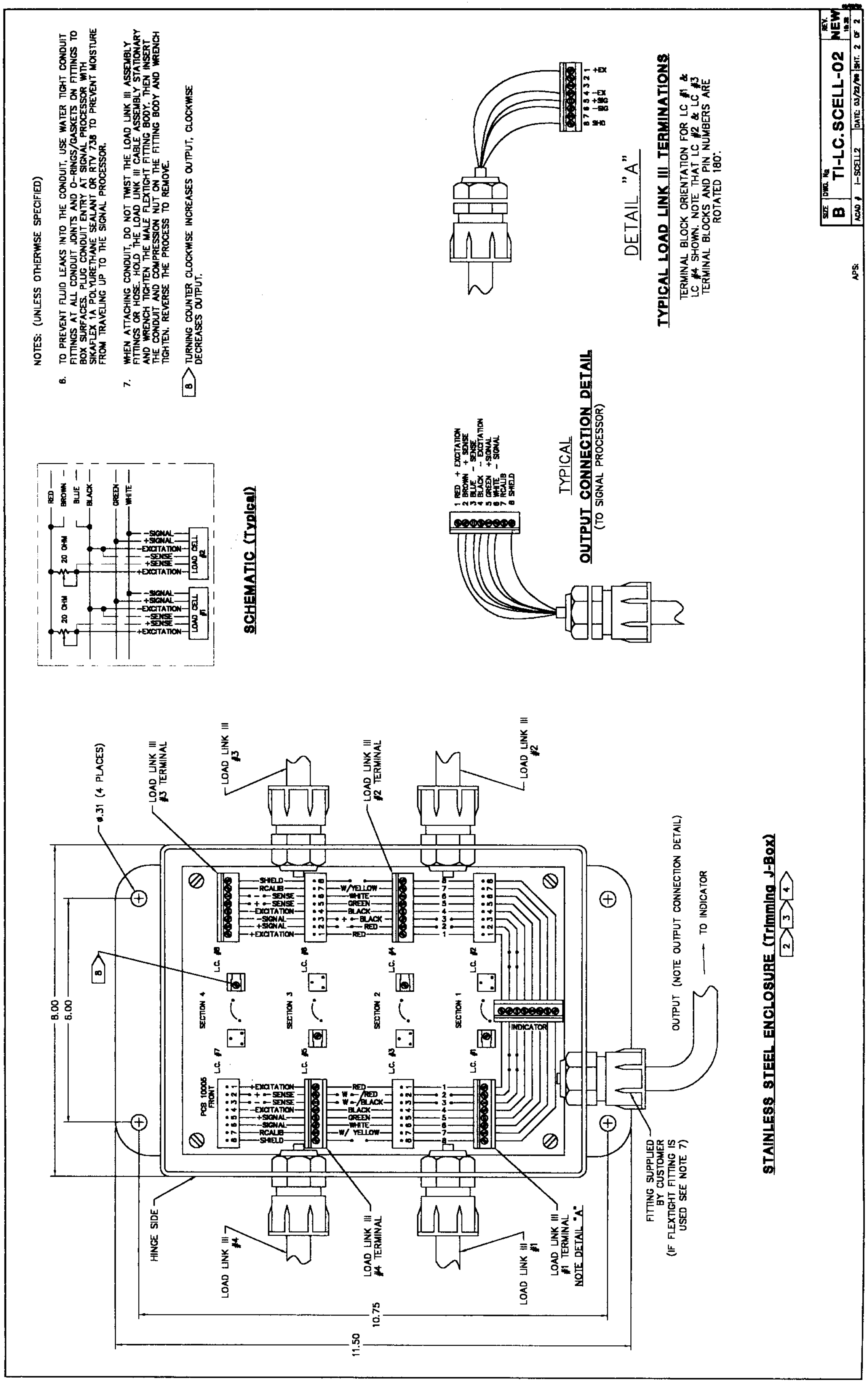
METRIC

SENSOR CAPACITY	A	B
20 kg.	63.5 mm.	125 mm.
50 kg.	63.5 mm.	125 mm.
100 kg.	63.5 mm.	125 mm.
200 kg.	76.2 mm.	170 mm.
500 kg.	76.2 mm.	180 mm.
1000 kg.	76.2 mm.	180 mm.
2000 kg.	89 mm.	190 mm.

APS:

SIZE	DWG. No.	REV.
B	TI-LC-SCELL-01	NEW
ACAD # I-SCELL1	DATE: 3/23/99	SHT. 2 OF 2


NOTES: (UNLESS OTHERWISE SPECIFIED)
1. ALL PARTS SUPPLIED BY CUSTOMER UNLESS OTHERWISE NOTED.
2. THIS DRAWING IS FOR GENERAL LAYOUT ASSISTANCE ONLY. LOCAL ELECTRICAL CODES AND PRACTICES SHOULD BE OBSERVED.
3 ATTACH SIGNAL CABLES TO THE STRUCTURE WHERE POSSIBLE TO PREVENT DAMAGE TO WIRES FROM ACCIDENTAL SNAGGING BY MOVING OBJECTS OR PARTS AROUND THE VESSEL.
4. INTERCONNECT JUNCTION BOX COVER MUST BE ON TIGHT AT ALL TIMES AND UNUSED OPENINGS SEALED WITH THE PLUGS PROVIDED.
5. J-BOX IS AVAILABLE IN CONDUIT AND NON-CONDUIT VERSIONS.
JUNCTION BOX, (SUPPLIED BY KISTLER-MORSE) 5
.250 DIA (6 PLCS) 4.
4.700
3.500
4.880
5.700
JUNCTION BOX IS 3/4" FEMALE NPT
TO SIGNAL PROCESSOR/ CONDUIT RUN
VESSEL HORIZONTAL SUPPORT BEAM
TO VESSEL HORIZONTAL SUPPORT BEAM (CHAIN SHOWN FOR REFERENCE)
LOAD LINK III TRANSDUCER WITH OPTIONAL ROD ENDS (SUPPLIED BY Kistler-Morse)
TO VESSEL GUSSET/FRAME (CHAIN SHOWN FOR REFERENCE)
DETAIL A
CONDUIT INSTALLATION
USING ONE J-BOX PER LOAD LINK III
FROM OTHER J-BOX (AS REQUIRED)
PRE-WIRED 10.0 FEET (3m) TRANSDUCER SIGNAL CABLE
DRIP LOOP (TYPICAL)
VESSEL HORIZONTAL SUPPORT BEAM
JUNCTION BOX ASSEMBLY (SUPPLIED BY Kistler-Morse) CABLE GRIP FITTINGS NOT SHOWN FOR CLARITY
TO SIGNAL PROCESSOR
FROM LOAD LINK III TRANSDUCERS
PRE-WIRED 10 FEET (3m) TRANSDUCER SIGNAL CABLE
DRIP LOOP (TYPICAL)
DETAIL B
FREE CABLE RUN INSTALLATION 3
+EX +SIG -SIG -EX SH
SHIELD BLACK WHITE SENSOR CABLE RED GREEN
TB2 thru TB5 CONNECTION DETAIL (TYPICAL)
+EX SNS+ SNS- -EX +SIG -SIG SH
SHIELD WHITE GREEN BLACK SENSOR CABLE RED BROWN BLUE
TB1 CONNECTION DETAIL (TYPICAL)
TO SIGNAL PROCESSOR (AS REQUIRED)
JUNCTION BOX (SUPPLIED BY Kistler-Morse)
UP TO FOUR (4) LOAD LINK III TRANSDUCERS
TRANSDUCER/JUNCTION BOX INTERCONNECT DIAGRAM
USING ONE J-BOX
TYPICAL SIGNAL CABLE ROUTING
SEE DETAILS A AND B FOR LAYOUT DETAIL SUGGESTIONS
TO SIGNAL PROCESSOR
ECO ACCUMULATION:
APPROVALS DATE
DRAWN: A.B.RIGOR 3/22/99
CHECKED:
PROJ. ENGR.:
PRODUCTION:
PURCHASING:
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES
DECIMAL ANGULAR
.X± NA ±NA
.XX± NA
.XXX± NA
DO NOT SCALE DRAWING
SCALE NONE
FINISH
USED ON: (REF ONLY) NA
Kistler-Morse Corp. Bothell, WA 98011
TITLE
LOAD LINK III TRANSDUCER INTERCONNECT DETAILS
SIZE B
DWG. No TI-LC.SCELL-02
REV. NEW
ACAD # I-SCELL2
DATE: 3/22/99
SHT. 1 OF 2


NOTES: (UNLESS OTHERWISE SPECIFIED)
6. TO PREVENT FLUID LEAKS INTO THE CONDUIT, USE WATER TIGHT CONDUIT FITTINGS AT ALL CONDUIT JOINTS AND O-RINGS/GASKETS ON FITTINGS TO BOX SURFACES. PLUG CONDUIT ENTRY AT SIGNAL PROCESSOR WITH SIKAFLEX 1A POLYURETHANE SEALANT OR RTV 738 TO PREVENT MOISTURE FROM TRAVELING UP TO THE SIGNAL PROCESSOR.
7. WHEN ATTACHING CONDUIT, DO NOT TWIST THE LOAD LINK III ASSEMBLY FITTINGS OR HOSE. HOLD THE LOAD LINK III CABLE ASSEMBLY STATIONARY AND WRENCH TIGHTEN THE MALE FLEXTIGHT FITTING BODY. THEN INSERT THE CONDUIT AND COMPRESSION NUT ON THE FITTING BODY AND WRENCH TIGHTEN. REVERSE THE PROCESS TO REMOVE.
8 TURNING COUNTER CLOCKWISE INCREASES OUTPUT, CLOCKWISE DECREASES OUTPUT.
SCHEMATIC (Typical)
20 OHM
RED
BROWN
BLUE
BLACK
GREEN
WHITE
LOAD CELL #1
LOAD CELL #2
STAINLESS STEEL ENCLOSURE (Trimming J-Box)
8.00
6.00
11.50
10.75
ø.31 (4 PLACES)
HINGE SIDE
LOAD LINK III #1
LOAD LINK III #2
LOAD LINK III #3
LOAD LINK III #4
LOAD LINK III #1 TERMINAL
NOTE DETAIL "A"
LOAD LINK III #2 TERMINAL
LOAD LINK III #3 TERMINAL
LOAD LINK III #4 TERMINAL
PCB 10005 FRONT
SECTION 1
SECTION 2
SECTION 3
SECTION 4
INDICATOR
FITTING SUPPLIED BY CUSTOMER (IF FLEXTIGHT FITTING IS USED SEE NOTE 7)
OUTPUT (NOTE OUTPUT CONNECTION DETAIL)
TO INDICATOR
TYPICAL
OUTPUT CONNECTION DETAIL
(TO SIGNAL PROCESSOR)
1 RED + EXCITATION
2 BROWN + SENSE
3 BLUE − SENSE
4 BLACK − EXCITATION
5 GREEN +SIGNAL
6 WHITE − SIGNAL
7 RCALIB
8 SHIELD
DETAIL "A"
TYPICAL LOAD LINK III TERMINATIONS
TERMINAL BLOCK ORIENTATION FOR LC #1 & LC #4 SHOWN. NOTE THAT LC #2 & LC #3 TERMINAL BLOCKS AND PIN NUMBERS ARE ROTATED 180°.
SIZE B
DWG. No. TI-LC.SCELL-02
REV. NEW
ACAD # I-SCELL2
DATE: 03/22/96
SHT. 2 OF 2
APS: